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WOOD AS A FUEL

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INTRODUCTION

Alaskans have always been large users of firewood. In remote areas where fossil fuel is expensive and in some cases unavailable, wood is still a major fuel supply. To the city dweller, a warm, glowing fire in a fireplace is pure nostalgia. It is also a compliment to a central heating system in the event of a power outage or a fuel shortage.

Wood is renewable fuel resource. Coal, oil, and gas are more efficient but are nonrenewable. Once used, they can never be replaced.

This publication provides information on what species of wood are best to use for fuel. It also suggests how to harvest wood and how to season it.

With the increasing awareness of the energy shortage, many Alaskans are turning to alternate or supplemental sources of heating fuel. Wood is an abundant resource in most areas of Alaska and is an excellent fuel if properly used.

Popularity of wood as a heating fuel has greatly increased in the past few years. Several of the advantages of wood for heating are:

- Wood is a renewable resource.
- Wood can provide an independent source of heat in case of power failure or a fuel shortage.
- Firewood is inexpensive, especially if the labor for producing the wood is supplied by the user (See table 1).
- Wood is a safe fuel if properly used.
- The ashes from a wood fire are biodegradeable and provide an excellent source of potash for garden fertilizer.
- Wood is much lower in irritating pollutants than most fuels.
- A wood fire is aesthetically pleasing from both visual and aromatic standpoints.

Wood has some disadvantages. These are:

- It is bulky to store and transport.
- It is heavy and may be dirty to handle.
- A wood fire is inconvenient, because it requires periodic attention, stoking, and ash removal.
- To achieve the greatest monetary savings from burning wood, a person must process his or her own supply. This is often hard work. It involves cutting, hauling, splitting, and stacking the wood.
- If the maximum heating value is to be obtained, firewood must be seasoned 6 months or more.
- Chimney fires can occur if wood is incorrectly burned and chimneys are not properly maintained.

The heat value that a fireplace log produces depends on the concentration of woody material, resin, water, and ash. When wood is compared to fossil fuels, a full cord of heavy hard-

wood, such as birch, weighs about 2 tons and is approximately equal in heating value to a ton of hard coal or 130 gallons of fuel oil.

TABLE 1—Approximate cost of heat from fuel oil and wood[1]

Fuel	Heat value	Delivered cost	Cost of heat per million BTU
	BTU	*Dollars*	*Dollars*
Home fuel oil . .	140,000/gal.	0.53/gal.	3.79
Dry birch	18,200,000/cord	65.00/cord	3.57
Dry spruce	15,000,000/cord	65.00/cord	4.33

[1]Based on 1978 Anchorage prices.

SPECIES CHARACTERISTICS

Several species of trees may be used for firewood. The most commonly used in Alaska are birch, spruce, cottonwood, hemlock, cedar, and aspen. The heat value produced by these woods varies according to their moisture content and dry weight. Wood that weighs more burns slower, and it produces much more heat. Table 2 shows the average heat values and approximate weights for four Alaskan species. Paper birch is the best wood Alaskan forests offer. It burns cleanly and hot with little sparking or popping.

The most critical factor to satisfactory burning is using dry wood. Heat is lost when water has to be warmed and evaporated, and the vapor must be further heated to flue temperature.

Green wood should not be burned in a slow, cool fire, because creosote will accumulate in the chimney flue and can cause a chimney fire. If green wood is burned, especially resinous spruce, make sure the fire is a hot one.

TABLE 2—Available heat units and weights of wood per cord[1]

Species	Air-dry wood	Green wood
	Million BTU	
Paper birch	18.2	16.7
Spruce	15.0	14.2
Hemlock	15.0	12.8
Aspen	14.1	12.1
	Pounds	
Paper birch	3,420	4,500
Spruce	2,520	3,060
Hemlock	2,520	4,500
Aspen	2,340	3,870

[1]One cord equals about 90 cubic feet of solid wood.

Chimney fires are commonly caused by filling the stove or fireplace full of small, fine fuels, such as loose paper, dry spruce boughs, or fine kindling. Fire consumes them so rapidly that hot flames surge through the chimney. Burn only a small amount of fine fuels at a time to prevent chimney fires. Woods, such as spruce and hemlock, are easy to ignite but burn rapidly with a hot flame. This is often undesirable, since it requires frequent attention and replenishment. To make a fire that will last longer and burn more uniformly, a hardwood, such as birch, would be your best choice.

If you burn hemlock or spruce in an open fireplace, be especially cautious. They contain moisture pockets in the wood. Upon heating, trapped gases and water vapors build pressure in these pockets and "pop" with great vigor. A metal or glass screen is needed to avoid burning spots on your rugs or furniture or, more seriously, burning your house.

The most rapid drying occurs when wood is piled in a sunny, well aerated place and the top of the stack is covered.

SEASONING WOOD

Again, the most important factor in efficient burning is using dry wood. Wet wood burns poorly in an open fire and produces less heat than dry wood. Wood with a high moisture content will burn more efficiently in a modern, slow, combustion furnace. These furnaces have a long flame path and recover most of the potential heat energy.

Wood that is cut green should be air dried for 6 months or more before use. The most rapid drying is obtained when the wood is piled in a sunny, well aerated place and the top of the stack is covered. During the drying process, most of

the moisture is lost from the ends of pieces of wood. So, cutting wood to final log lengths before seasoning will speed the drying process. Splitting wood aids drying and improves combustibility, especially with birch.

Standing hardwoods generally have a lower moisture content during the summer when soil moisture is less and leaves are actively transpiring water. During other seasons, the moisture content is considerably higher because of high soil moisture and low transpiration.

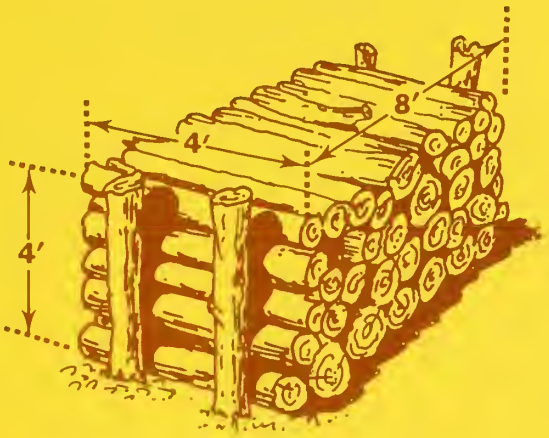
A method often used to reduce drying time is called leaf-felling. This method is used in the summer when trees are actively transpiring water. The tree is felled and left in place for about 2 weeks or until most of the water evaporates and the leaves wither. This method can be a fire hazard and an eyesore if not properly done. Check with the local fire warden to determine the potential fire danger before using this method.

BUYING FIREWOOD

The most common measure of firewood volume is the cord. A standard cord can be described as a well-stacked pile of logs that measure 4 by 4 by 8 feet, or about 90 cubic feet of solid wood.

To determine the volume of firewood in cords, the wood must first be stacked. Then, measure the dimensions of the stack in feet. Multiply the width by the height by the length to obtain the total cubic feet. Divide this figure by 128, which is the number of cubic feet in a standard cord. For example, a load of wood is stacked level in the bed of a pickup truck. You want to know how many cords are in the load. The truck bed is 1.5 feet high by 5.5 feet wide by 8.0 feet long.

$$5.5 \times 1.5 \times 8.0 = 66 \text{ cubic feet}$$
$$66 \div 128 = 0.52 \text{ cord}$$



A word of caution: Since green birch weighs approximately 4,500 pounds per cord, this pickup load weighs about 2,340 pounds. If you are transporting your own wood, know the weight capacity of your vehicle. Don't overload your vehicle; you will be asking for costly repairs.

One of the largest expenses for the firewood seller is the handling cost of seasoning and splitting wood. Your wood will be much less expensive if you do your own splitting and seasoning.

CUTTING FIREWOOD

Firewood taken from live, growing trees in a forest should be taken only from those trees considered undesirable. An undesirable tree would be one that is suppressed, diseased, or dying. These trees are competing with live, healthy trees for nutrients, moisture, and sunlight. When these are removed, the vigor and growth of remaining trees are increased.

If you have a problem identifying undesirable trees on your woodlot, contact the State Forester's Office or the U.S. Department of Agriculture's Forest Service for assistance. Make sure you have permission to cut or remove trees if the property is not your own.

Windthrown or dead trees make excellent firewood, because their moisture content is generally low. However, wood that has rotted makes poor firewood, because it is very low in heat value. Landclearing sites, logging slash, and road rights-of-way many times offer other good sources of firewood.

Personal or free use applications and permits may be obtained from the offices of the State of Alaska, Department of Natural Resources, Division of Lands, 323 E. 4th Avenue, Anchorage, Alaska 99505, or from the USDA Forest Service, 2221 E. Northern Lights Blvd., Pouch 6606, Anchorage, Alaska 99502. Very few easily accessible areas are open or available for firewood cutting, and they are not near population centers. Only dead or down timber may be cut in national forests.

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